# *The Holocene Palaeogeography of the Southeast Margin of the Bangkok Plain, Thailand, and Its Archaeological Implications*

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THE ARCHAEOLOGICAL SITE at Nong Nor, central Thailand, comprises the material remains of two phases of prehistoric occupation (Higham and Thosarat in press). The matrix of the site is a coastal midden, dating from the mid fifth millennium B.P., which contains burials of a later age. The initial expectation of the excavation of Nong Nor was that it would open the possibility of considering a site contemporaneous with the very rich estuarine settlement of Khok Phanom Di, 15 km to the north, which was occupied continuously for about 500 years (Higham and Bannanurag 1990, 1991; Higham and Thosarat 1993). The results of the Nong Nor excavations, however, indicate that the initial occupation predates that of Khok Phanom Di. This raised questions concerning the relationship between these two sites. To understand Nong Nor, a palaeoenvironmental investigation includes consideration of relationships between the archaeological remains and the natural sediments in the region, thus yielding indications of the physical site processes operating before, during, and after site occupation. This site-specific palaeoenvironmental study, however, demanded a broader regional perspective, which is largely reported upon here. This regional perspective is a palaeogeographical one, providing a geographical model of the region surrounding Nong Nor, detailed for the surrounding 35 km$^2$ and extending in less detail considerably further. The model now allows the site to be placed into a firm palaeogeographical setting, to predict the locations of further archaeological sites, and to place other known archaeological sites into firmer geographical and temporal context.

The site at Nong Nor is located on the present flood plain on the southeastern margin of the Bangkok Plain, approximately 4.5 km NNE of the town of Phanat Nikhom, Chonburi Province, and some 27 km east of the present coast of the

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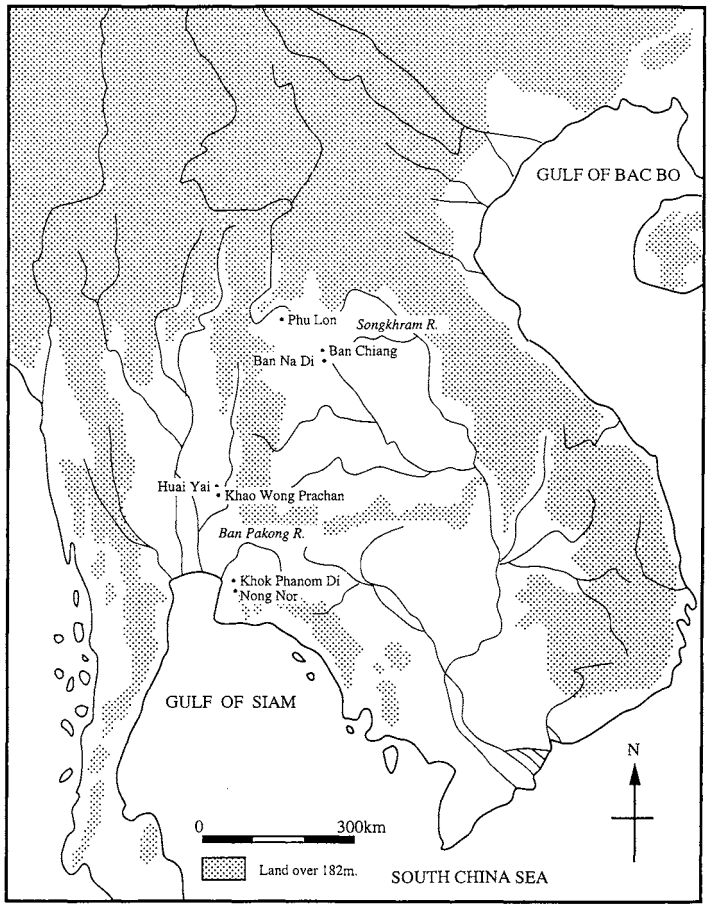


Fig. 1. Location map of the archaeological site of Nong Nor and its region, Chonburi, East Thailand.

Gulf of Siam (Fig. 1). The area is now under wet-rice cultivation and is seasonally flooded during the wet season. The site comprises the remains of a shell midden, approximately 200 $m^2$ in area and originally standing some decimeters above the field level, of which between 20 and 70 cm of midden thickness has survived. This lies over a natural substrate, the upper surface of which appears to have been partly burned. The cultural deposits are interleaved with, and related to, the surrounding natural sediments. Indeed, the economic analysis of the site indicates that this is a coastal resource site, thus linking the human use of the site with the geological development of the coast during the mid-Holocene marine transgression and regression.

Since the site is integrally linked with the recent geological evolution of the landscape, it is relevant to consider the geological setting of this area; full details of the local and regional geology will be published elsewhere (Higham and Thosarat in press). The archaeological site lies within the upper horizons of the

Bangkok Plain sediments. The plain itself is a large embayment representing long-term (Pliocene-Pleistocene) sedimentary infilling of a faulted structural depression, within which alluvial sands and gravels interbed with floodplain silts and clays grading seaward into deltaic clastics and marine clays (Nutalaya and Rau 1981; Jitapunkul 1982; Nutalaya et al. 1984; Somboon 1988; Somboon and Thiramongkol 1992). The latest sedimentation reflects mid-Holocene marine transgression and regression, when the sea appears to have risen to approximately 2 to 4 m above the present level (Chonglakmani et al. 1983; Somboon 1988; Somboon and Thiramongkol 1992; Takaya 1972; Thiramongkol 1987); Somboon (1988) identifies an early Holocene period of marine transgression from prior to 7800 years B.P., culminating in the shoreline reaching a maximum inland position between 7500 and 4600 years B.P., from where the sea regressed from some time before 4600 years B.P., eventually reaching the present shoreline position. The area described in this study represents a marginal situation within the broader picture of the Bangkok Plain, lying at its southeasternmost corner and at the mid-Holocene inland marine limit. The uppermost part of the embayment sediments thin notably to this southeastern edge (Nutalaya and Rau 1981), where they abut onto the rising Palaeozoic metasediments and crystalline basement. The bedrock forms a strongly undulating peneplain of c. 30 m relief, at between 10 and 100 m above sea level, with a surface mantle of laterites, saprolite, and foot slope deposits (Thiramongkol 1984). Takaya (1972) describes the sediments along this edge of the plain as being probable penultimate interglacial fan complex sediments with some younger fan deposits. The upper surface of this fan complex dips northwestward, and is overlain by Holocene marine and fluvial sediments. While such general statements are of some use, they provide little local detail of relevance to the specific study undertaken here. The local soil survey maps (Anonymous 1972) provide further information of a slightly more local nature. In general, there are two groups of soils on the plain, apparently equivalent to the fluvial/marine and fan deposits. Their distribution indicates that spatial patterning of sediments is moderately complex in this margin zone, despite the virtual absence of any geomorphological expression of differing sedimentary conditions. Soils to the east and south reflect the rising land surface, exposed bedrock, and the laterized surface.

To understand the environmental setting of the site, a detailed study of natural sediment distribution was undertaken during two site visits (January/February 1991, February 1992), primarily comprising field mapping and aerial photograph interpretation to determine the distribution of soil and sediment units in the region, excavation of sediment exposures on and around the archaeological site, examination of sediment exposures available in river banks and other cuttings, and collection of sediment samples for subsequent laboratory analysis. Laboratory analysis of sediment samples comprised sediment size, pollen, and diatom analysis of selected samples. From this investigation, two types of results are available: (1) a group of sediment sequence descriptions, supplemented by the results of sediment size, grain characteristic, and fossil pollen and diatom analyses; and (2) maps derived from examination of aerial photographs of the region within which the archaeological site lies. Methodological and interpretative details and full records of results are presented in the excavation report (Higham and Thosarat in press).

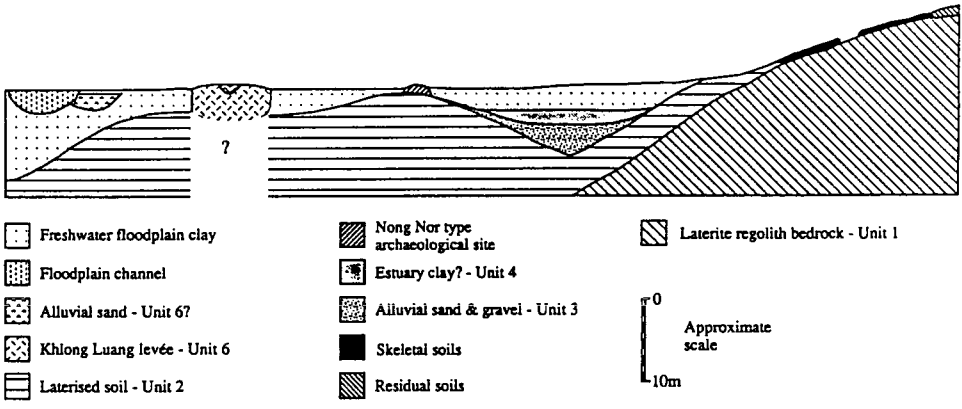


Fig. 2. Sketch section illustrating the stratigraphical relationships in the Nong Nor region, Chonburi, East Thailand.

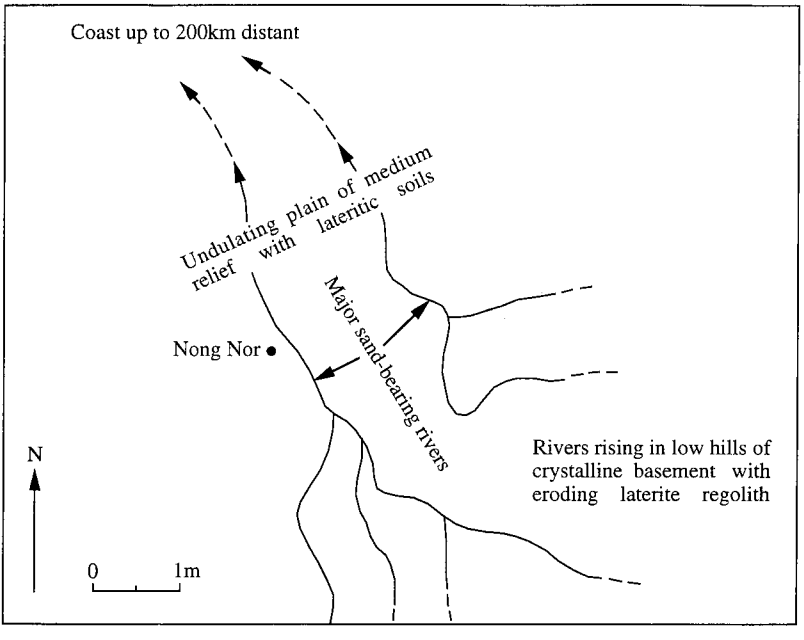


Fig. 3. The palaeogeographical model of landscape evolution in the Nong Nor region, Chonburi, East Thailand, during Palaeogeographical Phase 1, Late Pleistocene. Nong Nor was not occupied during this phase.

## STRATIGRAPHY OF THE NONG NOR AREA

The emphasis of this paper is to apply a palaeogeographical model of the area around Nong Nor, specifically to the archaeology and prehistory of that site. A summary of the sediments and their vertical and lateral relationships (Fig. 2) provides the basic stratigraphic framework within which to develop a palaeogeographical sequence representing the recent geological evolution of this landscape (Figs. 3–5). Dating of the following units is largely by consideration of stratigraphic relationships of sediments in the field and by comparison with chronostra-

TABLE 1: CORRELATION BETWEEN THE STRATIGRAPHIC UNITS, PALAEOGEOGRAPHICAL PHASES, AND GEOARCHAEOLOGICAL PERIODS FOR THE REGION OF NONG NOR, CHONBURI PROVINCE, CENTRAL THAILAND

| STRATIGRAPHIC UNITS | APPROXIMATE AGE | PALAEOGEOGRAPHICAL PHASES | GEOARCHAEOLOGICAL PERIODS |
|---|---|---|---|
| 5 & 6 | Late Holocene | 3 | 3 |
| 4 | Mid-Holocene | 2 | 2 |
| 3 | Late Pleistocene or Early Holocene | | 1 |
| 2 | Pleistocene (pre-Holocene) | 1 | pre-1 |
| 1 | Tertiary or Early Pleistocene | | |

tigraphies elsewhere. Several radiocarbon dates are available or becoming available for the period of site occupation and the presence of estuarine conditions during the mid-Holocene period (Stratigraphic Unit 4, Palaeogeographical Phases 3, Geoarchaeological Period 3) and will be reported fully in the site excavation report (Higham and Thosarat in press). In summary, the radiocarbon dates all cluster very closely around the period 3800–3900 years B.P. (uncalibrated radiocarbon dates). The stratigraphic sequence and the represented palaeogeographical phases for the Nong Nor region are as follows (correlation between these is indicated in Table 1).

### *Stratigraphic Unit 1: Bedrock*

This unit is composed of highly laterized in situ and iron-cemented weathered Palaeozoic metasediments and crystalline rocks forming the hills east of Nong Nor. These are generally overlain by thin stony skeletal soils, except on uppermost surfaces, where residual, partially cemented brown soils remain. Unit 1 represents geologically long-term weathering, with most soil and regolith having been recently eroded, leaving thin stony soils on slopes and residual patches of brown soil on upper hilltop surfaces. This weathering probably represents millions of years, possibly to middle to early Pleistocene or into the Tertiary period. The unit provides a source of sediment for Unit 3 and indicates that the hills east of Nong Nor supported skeletal soils and thus an impoverished biological environment by the time people were occupying the coast at Nong Nor.

### *Stratigraphic Unit 2: Laterized Silty Clay*

Unit 2 underlies superficial sediments in the low-lying area around Nong Nor and forms an undulating upper surface now mostly covered by floodplain sediments (Unit 5). The unit probably extends above the present floodplain upper surface elevation. This unit is moderately old: the soils are probably older than Holocene, older than the soils on Units 3 to 6, and much younger than soil on Unit 1. The relationship with Units 3 and 4 implies at least Last Interglacial origin. The lithology represents a probable prograding shoreline origin, although the evidence is equivocal. The undulating upper surface provides a land surface upon

which Units 3 to 6 were deposited, and the undulating upper surface provides a land surface upon which the human occupants of Nong Nor lived; the land surface had elevational relief of at least 5 m, contrasting subsequent and present landscapes.

*Stratigraphic Unit 3: Sand and Gravel River Channel Alluvium*

Unit 3 lies within topographic lows in the upper surface of Unit 2; its full depth is unknown but is at least 2 m within the lower points of the undulating upper surface of Unit 2. The sediments are derived from Unit 1. These coarse-grained sediments imply sedimentation during a period of greater soil and regolith erosion and higher energy river flow than at present and represents a period of low base level (low sea level) and relative climatic wetness. Deposition was probably during a late Pleistocene interstadial period or the early Holocene and may have been preceded by an erosional phase in which the channels now containing the unit were formed. This unit represents a late Pleistocene and early Holocene period of fluvial and noncoastal conditions in the area of the Nong Nor site.

*Stratigraphic Unit 4: Fine-Grained Clay-Rich Estuarine Sediments*

The sediments of this unit are weakly weathered, dark grey, partially organic clays. The unit represents conditions of variable low energy estuarine sedimentation, of probable mid-Holocene age, and related to the mid-Holocene high sea level. This represents environmental conditions equivalent to those implied by the archaeological evidence at Nong Nor and thus the natural conditions contemporaneous with the occupation of that site.

*Stratigraphic Unit 5: Freshwater Floodplain Sediments*

This unit comprises a thick blanket of blue-grey clays covering underlying units and forming the upper horizons of most of the present floodplain area. It includes channel infill deposits representing former channels similar to the present Bang Pakong river channel. Deposition was under conditions similar to those prevailing at present throughout most of the Bangkok Plain. The reason for a change from estuarine to freshwater conditions is unclear: possible sea-level lowering, shoreline regression due to sedimentation infill, or hydrological change due to the growth of coastal barrier(s). The unit represents higher water levels, at least temporarily, than previously. This unit represents the local onset of freshwater floodplain conditions and the end of estuarine conditions, with considerable reduction in landscape relief (to 0.5 m local relief) and thus a reduction of topographic landscape variability. Periodic infill, extinction, and local migration and replacement of river channels have occurred, and the onset of these conditions heralded the onset of conditions unsuitable for the early phase of human occupation at Nong Nor.

*Stratigraphic Unit 6: Sandy and Clay-Rich Levee Sediments*

The exact relationships between various sand bodies is unclear, as also is the lower stratigraphic boundary of this unit. This unit is apparently contemporaneous with

at least part of Unit 5; one of the sandy channels is cut by one of the Unit 5 channels and must be older. Some levee sediments continue to be deposited at present, and there is evidence for the periodic abandonment and replacement of stream channels. This unit provides evidence for the dynamic nature of late Holocene floodplain drainage and indicates that while some landscape change processes had largely ceased, the new landscape was still capable of substantial geographical change.

### *Palaeogeographical Phase 1*

This phase is represented by Stratigraphic Units 1, 2, and 3. Nong Nor lies on an undulating plain some distance (possibly > 100 km) from the coast (Fig. 3). This plain is underlain by a lateritic soil developed on probable Glacial-period deposits reworked in the upper tidal zone during a period of Interglacial high sea level and probably subsequently eroded during a Glacial or early Interglacial phase of low sea level to form an undulating land surface. The hydrology during this period is dominated by large sand- and gravel-bearing rivers flowing from the hills to the east and south. These hills have a crystalline and metasediment bedrock, now deeply weathered and highly laterized, with the regolith from this weathering continuing to be eroded to provide the fluvial bedload. The soils on this plain, now showing signs of laterization, probably represent equivalent, if younger, soils to those originally found on the hill slopes. In the hills only small areas of original soil are present on the upper surfaces, and generally the hills would have been characterized possibly since the middle Pleistocene and into the late Pleistocene and Holocene by increasingly impoverished edaphic and thus probably vegetational conditions. Human occupation is unknown for this period.

### *Palaeogeographical Phase 2*

This phase is represented by Stratigraphic Unit 4 and possibly by some of the superficial soils and sediments of Unit 1, along with the Nong Nor site. Phase 2 represents the culmination of the sea-level rise and shoreline progradation around 4000 to 5000 years ago (Fig. 4). East of Nong Nor, former river valleys were flooded by the sea to form estuaries. Sedimentation changed in response to this adjustment and became restricted to fine-grained sediment deposition in the centers of the former river channels. West and north of Nong Nor, open shore lined the eastern edges of an open marine embayment. Nong Nor now lies on the eastern edge of a narrow (c. 1 km wide) spit of land, bounded to the east by an estuary and to the west by open shore. Furthermore, open shore also lies only several kilometers to the north. The estuary shoreline at Nong Nor was variable in nature, with both fine-grained soils of the former plain and the coarser-grained of the former river channels exposed at the surface nearby. Additionally, fine-grained sediments were being deposited within the tidal area of the estuary itself. The exact location of the upstream freshwater limit of this estuary is unknown, but probably lies within 5–10 km of Nong Nor. At the estuary mouth, c. 4 km from Nong Nor, a few coastal sand dunes were formed. This phase represents the period of greatest environmental diversity in the region and clearly provided a wide range of environmental resources for the prehistoric occupants of Nong Nor.

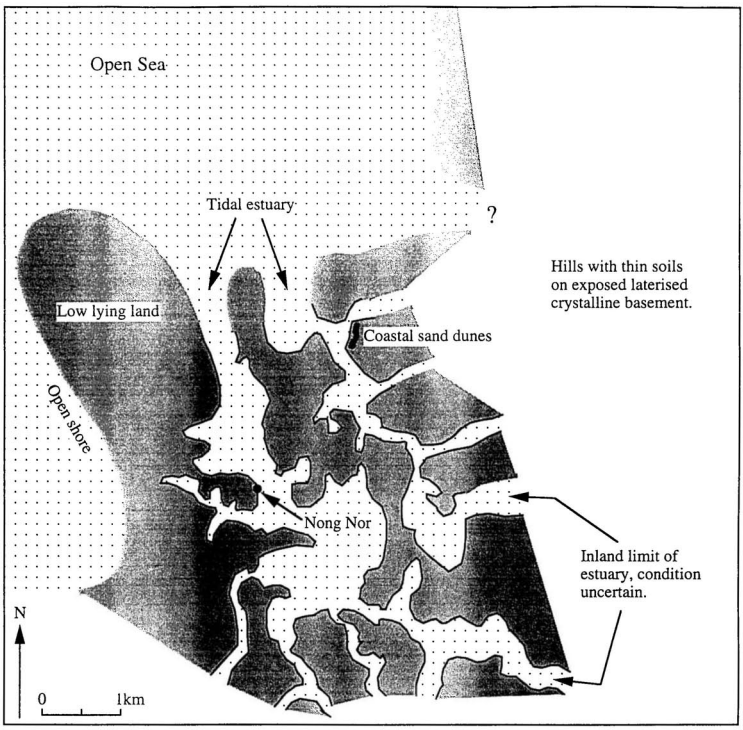


Fig. 4. The palaeogeographical model of landscape evolution in the Nong Nor region, Chonburi, East Thailand, during Palaeogeographical Phase 2, Mid-Holocene. Nong Nor was occupied during this phase as a coastal resource site.

### *Palaeogeographical Phase 3*

This phase is represented by Stratigraphic Units 5 and 6 and indicates the final phase of landscape development, although by no means one of invariable environmental conditions (Fig. 5). The dominant process is that of freshwater seasonal flooding, resulting in the deposition of clay-rich sediments throughout the low-lying area, infilling topographic depressions and blanketing much of the landscape, resulting in the reduction of local relief to the present conditions of a quasihorizontal land surface. Drainage of the flood plain has changed during this period, with at least three probably related phases. The present drainage along the Klong Luang has been altered by recent artificial drainage, although an earlier drainage stage resulted in the formation of a levee similar to that at present. This may have drained into a large river, and appears to have been replaced by such a channel as it migrated across the flood plain. Following infilling of this, the present Klong Luang became the main natural drainage in the area. Little evidence indicates the location of a shoreline during this Phase, and it was either migrating towards its present position, or replaced rapidly due to some event such as the establishment of coastal barriers. The shift from Palaeogeographical Phase 2 conditions of coastal/estuarine sedimentation to freshwater floodplain conditions resulted in environmental conditions unsuitable for the human occupation of Nong Nor as a coastal site.

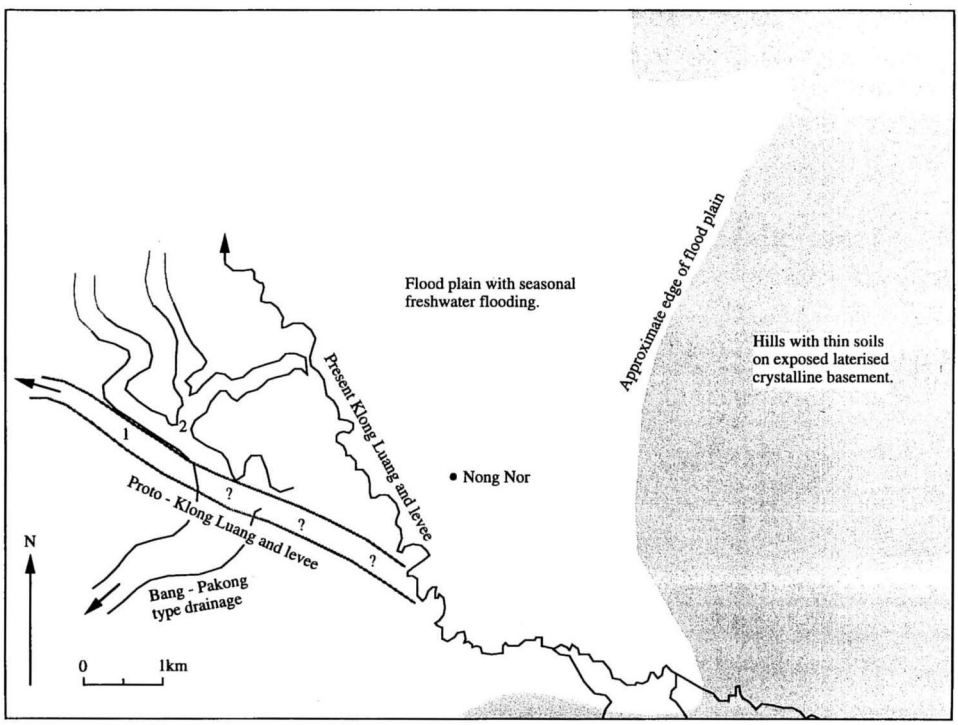


Fig. 5. The palaeogeographical model of landscape evolution in the Nong Nor region, Chonburi, East Thailand, during Palaeogeographical Phase 3, Mid-late Holocene. Nong Nor was intermittently used during this phase as an inland site.

## ARCHAEOLOGICAL IMPLICATIONS OF THE PALAEOGEOGRAPHICAL MODEL

The archaeological implications of the palaeogeographical model fall into three categories: (1) implications derived from the variability of past landscapes in the area; (2) implications regarding the prehistoric occupation of the Nong Nor archaeological site; and (3) implications regarding the distribution and location of other archaeological sites.

### *Variability of Past Landscapes*

Clearly the Nong Nor landscape has changed considerably during the Holocene. Of particular interest is the change in the ranges of microenvironments, expressed most cogently in the changes of local relief upon what is now a relatively flat and geomorphologically featureless flood plain. The early period of known human occupation of this area, that is, the period of midden construction at Nong Nor, was one in which a wide range of microenvironments was available within a small distance from the site. In addition to the range of estuarine conditions, both in terms of substrate and vegetation, open shore conditions were present within 4–5 km by water and closer by land. Freshwater conditions at the upper limit of the estuary were within a few kilometers from the site, and a range of dryland conditions were either within immediate access to the site, within a short distance across the estuary, or a little further from the site on the hills rising to the east of

this area. Furthermore, prior to the onset of coastal conditions around Nong Nor, the region was characterized by a range of dryland environmental conditions supported by extensive freshwater fluvial resources. Of note is the greater degree of local relief and the presence of substantial rivers; the usual range of river valley and interfluvial landscape elements were present during this period which, combined with the diversity of hillslope environments to the east, would have provided a locality for human occupation of considerable environmental potential in terms of resource range and availability.

### *Prehistoric Occupation of Nong Nor*

Prehistoric occupation has been introduced above, especially in relation to the potential range of, and availability and access to, environmental resources from this site. Of note is the relatively small size of a rich resource catchment required by the site occupants, at least during the occupation phase represented by the midden construction. This rich catchment probably contrasted the inland areas bordering this site, where soil degradation and probable vegetational impoverishment had been occurring for some time prior to the occupation of Nong Nor. A further implication is that the area around Nong Nor may have been occupied by quite a large population, and thus other approximately contemporaneous archaeological sites may be concentrated in this marginal zone of the Bangkok Plain.

### *Distribution and Location of Other Archaeological Sites*

The palaeogeographical model provides an opportunity to assess the distribution of other archaeological sites on the flood plain in this region. This can be done in terms of both the spatial and chronological site distribution and has a predictive capacity, both for probable site location and establishment of relative site ages. Assessment of Figure 4 provides opportunity, for example, to identify probable locations of sites that are broadly contemporaneous with Nong Nor. In this case, several localities were identified in the field as occurring on or very close to the presumed shoreline during Palaeogeographical Phase 2, and these localities were examined for potential archaeological remains. Three such sites proved to be prehistoric sites with typical evidence for a former coastal economy, whereas a fourth reported site does not accord with the palaeogeographical model as a shoreline site. While there is no evidence regarding the age of this latter site, its lack of coastal archaeological elements accords well with its geomorphological setting. Of wider applicability, the palaeogeographical model provides the following spatiochronological framework, defined in terms of geoarchaeological periods, for site location in the region around Nong Nor (Fig. 6; Table 1).

### *Geoarchaeological Period Pre-1*

The equivalent palaeogeographical unit is Pre-Phase 2, within which there may have been prehistoric human occupation of this then-inland region. Site location is difficult to predict and depends upon the preferred model of adaptation to the landscape and pattern of resource access and utility. Around Nong Nor sites, had they occurred, would probably have been on the topographic rises lying between

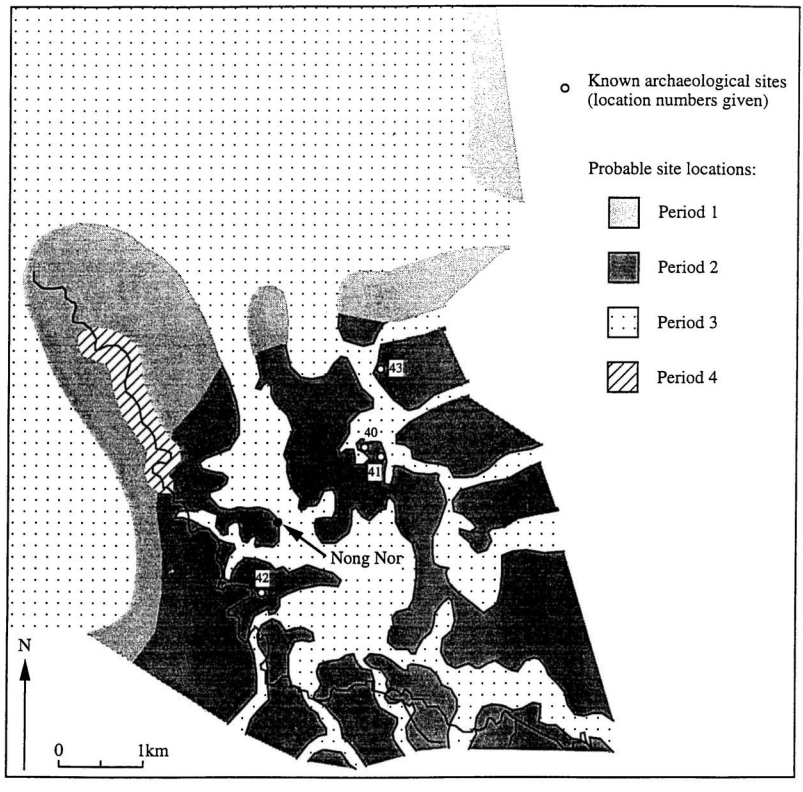


Fig. 6. Geoarchaeological model of the chronological framework for spatial distribution of archaeological sites in the Nong Nor region, Chonburi, East Thailand. Note that the distribution of potential Geoarchaeological Period Pre-1 sites is not indicated; such sites may be expected at depth to the north and west and on the land surface to the east and south.

the rivers running through the landscape. Given the apparent lack of sedimentary accumulation other than in river channels, the apparent dominance of processes of weathering and nonaccumulation of sediments under the open terrain conditions, erosion of lateritic soils and exposure of the duricrust on the hill slopes, and marginal erosion associated with the later marine transgression, it is unlikely that archaeological sites would have survived on these now-submerged topographic highs.

### *Geoarchaeological Period 1*

This period is equivalent to Palaeogeographical Phase 2. The process of mid-Holocene marine transgression over the Phase 1 landscape was progressional over a surface gradually rising from the west toward Nong Nor. The upper surface of the present floodplain is more-or-less level, so the pre-mid-Holocene surface is probably buried under increasingly greater depths of recent sediment to the west and northwest. Early Phase 2 sites may be preserved under this modern surface, although submergence of land during the rapid sea-level rise was probably accompanied by erosion and redistribution of sediments, thus tending to mitigate

against site preservation. If sites survived, they would represent the pre-Nong Nor prehistoric coastal occupation of a transgressing shoreline, each of short duration as the sea-level rise created a rapidly transgressing shoreline. If such sites are present, they may be found at shallow depth along and to the west and north of the mid-Holocene shoreline and would date from shortly before, if not be virtually contemporaneous with, the occupation of Nong Nor.

### *Geoarchaeological Period 2*

Palaeogeographical Late Phase 2 is associated with this period and the occupation of Nong Nor as a coastal site, and represents the culmination of the shoreline transgression at its inland limit. The location of Nong Nor is distinctive: a shoreline site on the west bank of an arm of the mid-Holocene estuary; to the west is a spit and the open sea. This location would provide some protection from adverse weather, and this geographical advantage would have complemented the resource access advantage of being situated on an estuary. The identification of the position of this shoreline allows local prediction of other equivalent archaeological sites, and similar location of other sites suggests deliberate prehistoric selection of site locality. Coastal archaeological sites of this antiquity probably do not occur locally more than several kilometers from Nong Nor: the open shore lies within 2 km to the west, the mouth of the estuary lies within 4 km to the north, the base of the hills rising to the east lies within 5 km to the east, and the freshwater upstream limit of the estuary may lie only 5 km south/southeast of Nong Nor.

### *Geoarchaeological Period 3*

This period is equivalent to Palaeogeographical Phase 3. During and following the cessation of estuarine conditions, the location of coastal sites would have migrated westward as the shoreline relocated seaward. Such sites would no longer be expected around Nong Nor, and coastal sites lying beyond the western limit of Palaeogeographical Phase 2 land will be younger than Nong Nor. Depending on the process of shoreline regression, sites may be progressively younger toward the present shore, and such sites would have been relatively short-lived. An alternative process influencing site distribution is the creation and infilling of river channels, which may result in the presence of sites younger than those surrounding the former channels.

### *Geoarchaeological Period 4*

This represents a late portion of Palaeogeographical Phase 3 and is a subperiod of Period 3, representing the locations of sites on the present river levees. This represents one of the more recent periods of human occupation of the landscape during the later part of Palaeogeographical Phase 3.

## OVERVIEW OF STRATIGRAPHIC, PALAEOGEOGRAPHICAL, AND GEOARCHAEOLOGICAL MODELS OF THE NONG NOR REGION

Examination of the sediment and weathering stratigraphy of the region around Nong Nor allows the site to be placed within its palaeogeographical context (Fig.

2, Table 1). Stratigraphic Units 1 to 3 represent pre-Holocene conditions and provide a basement upon which Holocene sediments were deposited, whereas Stratigraphic Units 4 to 6 represent Holocene conditions and have the greatest bearing upon the archaeology of this area. Stratigraphic Unit 4 represents deposition under estuarine conditions during the mid-Holocene period of high sea level, whereas Stratigraphic Units 5 and 6 represent sediments deposited under subsequent freshwater floodplain conditions similar to those prevailing at present throughout the Bangkok Plain. The latter units include the thick blanket of blue-grey clay covering earlier sediments, and the laterally restricted levee sediments of the present drainage channels and their predecessors. This stratigraphic sequence provides the basis for the palaeogeographical model of the region (Figs. 3–5). Palaeogeographical Phase 1, probably of Late Pleistocene age, represents Nong Nor lying on an inland undulating plain through which large sand-bearing rivers flow from hills to the south and east. Evidence for human occupation of both the plain and neighboring hills is not available. The Palaeogeographical Phase 2 is the mid-Holocene phase in which sea-level rise and marine transgression resulted in the plain and bordering river valleys being flooded by the sea. At the inland limits of this transgression, river valleys converted to estuaries and slopes converted to open shorelines; in the Nong Nor area, this coastal geography expresses itself as a complex of estuarine channels flowing into an open sea embayment. This phase is most relevant to the archaeology of Nong Nor in that, first, it represents the geographical conditions under which the original occupants lived and, secondly, it represents the period of greatest environmental diversity in this region, with a wide range of environmental resources within the small site catchment. Palaeogeographical Phase 3 represents mid- to late-Holocene conditions of freshwater seasonal flooding following the cessation of estuarine and other coastal conditions. This shift in landscape process resulted in the formation of a floodplain of very low relative relief with a surficial drainage system notably variable both in nature and through time. Such conditions were unsuitable for the coastal resource occupation of Nong Nor. This palaeogeographical model allows archaeological sites in this region to be placed into a locational-chronological framework of geoarchaeological periods (Fig. 6), allowing assessment of archaeological site locations and ages within the context of the region's palaeogeography. It also allows prediction of site locations or at least provides geographical limits to potential site locations. Geoarchaeological Period Pre-1 is a speculative period predating the Palaeogeographical Phase 2, within which there may have been human occupation of this inland plain and the neighboring hills, but for which the potential for archaeological preservation is likely to be poor. Geoarchaeological Period 1 represents early Palaeogeographical Phase 2 sites which, if they exist, would be preserved at depth and would represent short periods of prehistoric occupation of the then-transgressing mid-Holocene shoreline. Geoarchaeological Period 2 is the period of occupation of Nong Nor as a coastal site and represents the inland limit of shoreline transgression; it is probably the period of most stable coastal site occupation. Geoarchaeological Period 3 occurs during and following the cessation of coastal conditions around Nong Nor, and prehistoric coastal sites would have followed the prograding shoreline westward. Such sites are no longer expected around Nong Nor, and archaeological sites with a coastal signature beyond the western limit of the Palaeogeographical Phase 2 land are probably

younger than Nong Nor. Lastly, Geoarchaeological Period 4 represents the more recent location of archaeological sites on the levees of present rivers. These sites, together with potential sites associated with older levee deposits, represent the noncoastal human occupation of a seasonally flooded plain. Consideration of some of the archaeological sites around Nong Nor appears to conform to this locational-chronological framework for the archaeology of the region, and further examination of the sites recorded during the 1984 Bang Pakong Valley Survey may enhance the conclusions reached here. For the moment, these models provide geographical components to the archaeological examination of the prehistoric remains of occupation at Nong Nor and its environs, including identification of potential resource catchment limits, preferred locations for occupation, the nature and temporal limits for change within the surrounding environment, and a relative chronological framework for all archaeological sites in this region.

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## ABSTRACT

The archaeological implications of a palaeogeographical model of the region surrounding an archaeological site, Nong Nor, on the southeastern margin of the Bangkok Plain are presented. The regional stratigraphic sequence provides the basis for a regional palaeogeographical model extending from Pleistocene to late Holocene times. The model comprises three major phases of landscape development reflecting the evolution of the region's landscape from an inland undulating plain completely unlike the present floodplain, through a phase of marine inundation and coastal conditions, to the present freshwater floodplain environment. This sequence provides a geographical framework for the prehistoric occupation of the midden at Nong Nor. In particular, it is possible to describe the landscape in which the prehistoric occupants lived and the distribution of environmental resources available to these people. The palaeogeographical model also provides a chronological framework for the prehistoric occupation of the site and the construction of the midden by reference to the timing of changes in environmental processes and conditions throughout the Holocene. Finally, the palaeogeographical model provides a basis for predicting the location and ages of other prehistoric sites within the landscape; in this respect, a geoarchaeological model partitions the landscape according to the potential for presence and preservation of archaeological sites of various types and ages. KEYWORDS: palaeogeography, geoarchaeology, site distribution, Holocene, Thailand, Southeast Asian archaeology.